TECHNICAL facts

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Developing Protocols for GHG Mitigation Projects: A Technology-Based Approach

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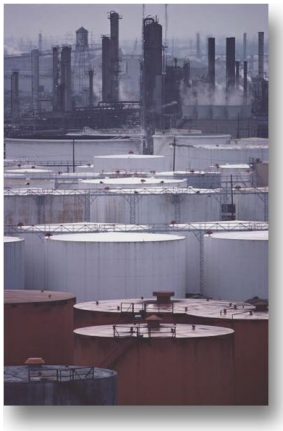


The successful use of project-based market mechanisms will require the development of transparent, cost effective, and environmentally sound protocols for quantifying emission reductions. Over the years, a number of approaches have been proposed for quantifying project-level emission reductions. However, to date these approaches have been discussed mainly in the abstract. The National Energy Technology Laboratory (NETL) has used case studies of real world examples to test the efficacy of the major emission reduction estimation approaches in the market.

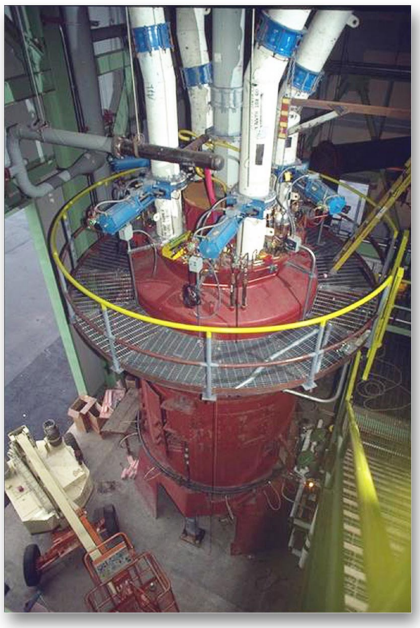
Review of Emission Baseline Approaches

In a recent report, *Developing Emission Baselines for Market-Based Mechanisms: A Case Study Approach*, NETL examines three major baseline approaches – the project-specific approach, the benchmark approach, and the technology matrix approach. The review focuses on two issues: the procedures for screening out free rider projects and the methods for quantifying emission reduction credits. The analysis applies the three approaches to three sample case studies: a coal-fired efficiency improvement project in India, an integrated gasification combined cycle (IGCC) project in China, and a fuel cell rural electrification project in Argentina.

Of the three approaches considered, the project-specific is found to be the most accurate emissions estimation method in terms of screening out free rider projects. However, this approach also has the highest transaction costs. In comparison, the benchmarking and technology matrix approaches have lower transaction costs, but these emission estimation methodologies are more likely to award credits to free rider projects.

The Modified Technology Matrix: An Alternative Baseline Approach

Based on this review, NETL recommends modifying the technology matrix approach by adding a more effective means of screening out free rider projects. This modified technology matrix would consist of a selected list of greenhouse gas emission reduction technologies. To be included on this list a candidate technology would have to pass a rigorous test of its commercial viability and market penetration. In general, only advanced, non-commercial technologies would pass the test and qualify for inclusion in the technology matrix.



In addition to the list of pre-approved qualifying technologies, the matrix would include stipulated benchmarks for each technology based on the emission performance of a selected group of counterfactual technologies. To qualify for emission credits, project developers would simply demonstrate that the proposed project technology is included in the matrix. Then the amount of credits to be awarded to the project would be determined by subtracting the project's emission rate from the stipulated benchmark. Because the modified technology matrix will focus on advanced, non-commercial technologies, it should be supplemented with the project-specific approach. The latter approach should be used to assess the environmental and emissions performance of projects using conventional technologies.

Applying Case Studies to Develop the Modified Technology Matrix

Drawing on the analysis from the above-described report, NETL produced a follow-up report, *Developing the Technology Matrix for India and Ukraine*. The purpose of this report was to illustrate the development of the technology matrix for ten selected technologies for India and Ukraine. The study included a country-specific test to screen out free riders and the development of proposed emission benchmarks for all ten qualifying technologies (Table 1). The technologies examined include: supercritical coal, IGCC, natural gas combined cycle (NGCC), fuel cells, wind turbines, compressed natural gas (CNG) vehicles, hybrid vehicles, gas-to-liquids, coalbed methane (CBM) recovery, and NETL's energy-plex concept.

Table 1. The Modified Technology Matrix: Sample Case Study Results

TECHNOLOGY	TECHNOLOGY APPLICATION	COUNTRY			
		INDIA		UKRAINE	
		Free Rider Technology?	Stipulated Benchmark	Free Rider Technology?	Stipulated Benchmark
Supercritical Coal	All	No	Steam turbine plant with subcritical, PCF boilers	Yes	Coal-fired steam turbine plant
IGCC	All	No	Steam turbine plant with PCF boilers	No	Coal-fired steam turbine plant
Wind Turbine	Off-grid	No	Diesel generators	No	Diesel generators
	On-grid	No	A composite representing average emission rate of recently-built capacity.	No	A composite representing average emission rate of all existing capacity.
Solid Oxide Fuel Cells	Commercial cogeneration	No	Diesel generators	No	Diesel generators
	Low-cost fuel	No	A composite representing average emission rate of recently-built capacity.	No	A composite representing average emission rate of all existing capacity.
	Distributed generation	No	Use Project-Specific Approach	No	Use Project-specific Approach
Hybrid (electric/ gasoline) Vehicles	Passenger Cars	No	Composite of gasoline and diesel vehicles	No	Composite of gasoline and diesel vehicles
	Transit buses	No	Composite of diesel vehicles	No	Composite of diesel vehicles

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Conclusions

Through the analysis of the selected technologies in India and Ukraine, NETL highlighted key issues to be addressed during matrix development, identified data requirements, determined the availability of data to meet these requirements, and assessed the quality of the available data.

To obtain a copy of *"Developing Emission Baselines for Market-Based Mechanisms: A Case Study Approach"* or *"Developing the Technology Matrix for India and the Ukraine"* contact

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